IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (previously presented): A system for monitoring drill bit performance, comprising:

a plurality of sensors located on a downhole section of a drill string; and

downhole circuitry for processing states of said sensors to thereby derive and communicate

a first warning state when the states of said sensors indicate that failure of the bit is beginning, and

a second warning state when the states of said sensors indicate that final failure of the bit is at hand.

2. (original): The system of claim 1, wherein said first warning state is indicated to a surface operator by variation of drilling fluid pressure, said variation caused by movement of a valve located in said drill string.

3. (original): The system of claim 1, wherein said first and said second warning states are indicated to a surface operator by varying the position of a valve located in said drill string.

4. (original): The system of claim 1, wherein said first warning state and said second warning state are independently derived, and said second warning state can be detected by said sensors and said circuitry even under some failure conditions which would preclude detection of said first warning state.

5. (original) The system of claim 1, wherein said sensors include both a first type of sensor and a second type of sensor.

6. (currently amended) A downhole assembly which indicates a failure condition, comprising:

a valve capable of ~~by~~ irreversible movement ~~of a valve~~ which affects mud flow impedance from a first state which is initially present during normal drilling ~~irreversibly~~ into at least one intermediate state having reduced mud flow impedance which indicates a failure condition, and thereafter irreversibly into a final state, which returns mud flow impedance to substantially that seen during normal drilling.

7. (original): The assembly of claim 6, further comprising sensors located on said downhole assembly which monitor parameters indicative of drill bit condition.

8. (original): The assembly of claim 6, wherein said valve movement occurs at a time constant of at least about one second.

9. (previously presented): The assembly of claim 6, wherein said mud flow impedance is varied by opening an aperture which allows mud to flow from the interior of the drill string to a bore hole.

10. (original): A method of operating a drill rig, comprising the steps of:

monitoring downhole mud flow impedance;

halting drilling when said impedance is altered by a downhole valve which opens or closes a shunt path for mud flow;

wherein said valve changes position according to readings of one or more sensors located on a downhole sub assembly.

11. (original): The method of claim 10, wherein said one or more sensors measure axial strain.

12. (original): The method of claim 10, wherein said one or more sensors measure vibrational frequency.

13. (original): The method of claim 10, wherein data from said one or more sensors are analyzed by an adaptive filter.

14. (previously presented): A method of operating a drill rig, comprising the step of:

using downhole circuitry to signal a change in downhole equipment condition by causing a reduction in drilling fluid long-time average pressure.

15. (previously presented): A method of operating a drill rig, comprising the step of:

using downhole circuitry to signal a change in downhole equipment condition by causing a reduction in drilling fluid long-time average pressure;

wherein said reduction in drilling fluid long-time average pressure is caused by irreversible movement of a valve.

16. (cancelled):

17. (original): The method of claim 14, wherein said change in downhole equipment condition is detected by a downhole sensor.

18. (original): The method of claim 14, wherein said change in downhole equipment condition is determined by an adaptive filter which analyzes data from sensors located on the drill string.

19. (previously presented): A method of operating a drill rig, comprising the step of:

using downhole circuitry to signal a change in downhole equipment condition by causing a reduction in drilling fluid long-time average pressure;

wherein said change in downhole equipment condition is determined by an adaptive filter that uses past signal measurements obtained from sensors located on the drill string to predict future signal measurements.